CHAPTER TWO

USING AND REVISING FLOOD INSURANCE STUDIES AND MAPS

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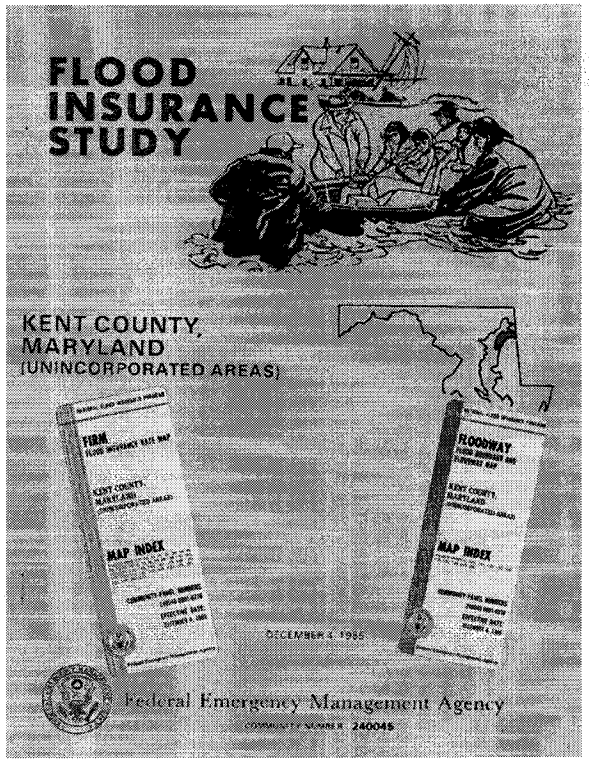
I. Using the Flood Maps and Study

A. Introduction

Achieving the goals and objectives of floodplain management, including proper administration of a floodplain ordinance, depends on community officials being able to correctly interpret floodplain maps and supporting documentation in the Flood Insurance Study (FIS). This chapter will cover the technical data which serve as the regulatory basis for floodplain management ordinances in Maryland.



The FIS for a particular community identifies the areas subject to flooding, and provides the data necessary to regulate future floodplain development. It includes floodway data tables and flood profiles for riverine watercourses that have been studied in detail. Included as part of the FIS is a Flood Boundary Floodway Map (FBFM) if the community has a floodway identified as part of the study. If not, a copy of the Flood Insurance Rate Map (FIRM) will be included with the FIS. In studies and maps issued or revised since January 1, 1985, the FBFM is combined into the FIRM and only a FIRM is issued.

Communities with a floodway must first determine if a proposed project is in the floodway by referring to the FIS and the FBFM. The ordinance specifies extreme

development restrictions for the floodway since the 100-year discharge must flow through the floodway; usually no new structures are allowed. As NFIP regulations allow no increase in water surface elevations in the mapped floodway, it is extremely important to make a correct floodway determination prior to issuing any permit. Use of the flood profiles will allow precise determination of 100-year flood elevations at a specific location.

Whenever a local permit official attempts to make a floodplain determination from the maps, there may be a few borderline situations where the development is not clearly in, or out of, the floodplain. The local official is authorized to make a best effort determination by scaling from the map. In such cases, it is advisable to visit the site to determine if the map seems reasonable, or, better, to require an elevation survey of the natural grade at the lowest point where the proposed structure will be located. For permit purposes, elevations prevail, although a Letter of Map Amendment should be sought to remove a site or structure from the floodplain when elevations prove it to be above the flood elevation. Assistance from the Maryland Coordinating Office or Region III of FEMA may be requested if the local official is not comfortable in making the determination.

Lending institutions use the FIRM to determine if a structure is located in the 100-year floodplain. If it is, the lending institution must require a person securing a federally insured loan to purchase flood insurance as a condition of the loan. A Letter of Map Amendment officially removes a structure or lot from the floodplain and will remove the mandatory purchase requirement for flood insurance.

B. Types of Floodplain Delineations

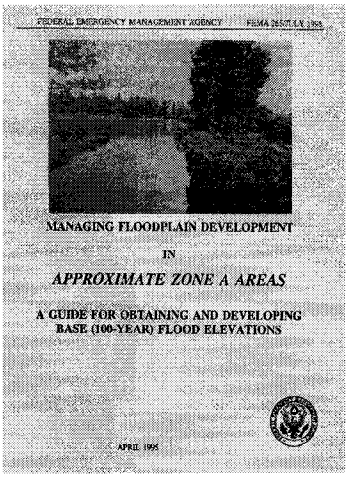
Normally, a detailed study is completed and a FIS, FIRM, and FBFM published when a community is converted to the Regular Program of the NFIP. A few communities with minimal or no flood hazard or low potential for future development were converted into the Regular Program without a detailed study. In these cases, the old Flood Hazard Boundary Maps (FHBM) were directly converted to the FIRM, or no FIRM was produced, and the community was notified of the method of conversion to the Regular Program and which map to use.

Prior to the start of each FIS, a meeting was held with community officials to discuss existing flooding problems and future floodplain development activity. As a result, a FIS may contain the following two types of floodplain delineations:

1. Detailed Study

Identified special flood hazard areas with existing or proposed floodplain development are normally studied by detailed engineering methods which include a projected 100-year flood height stated in feet above mean sea level. Hydrologic and hydraulic computer models are used to determine flood elevations for different discharges in the watercourse which are related to storm frequencies. The detailed study develops flood elevations for various frequency floods, the 10-, 50-, 100-, and 500-year events. The 100-year flood serves as the basis for regulating floodplain development.

Hydrologic methods determine the amount of water flowing in a river or stream for a given frequency flood event, based on the amount of rain and the runoff expected from the surrounding watershed. Hydraulics determine how the river or stream channel will accomodate the flow and the depth of flooding. Specialized computer programs are used to perform hydrologic and hydraulic computations using stream cross-section data.

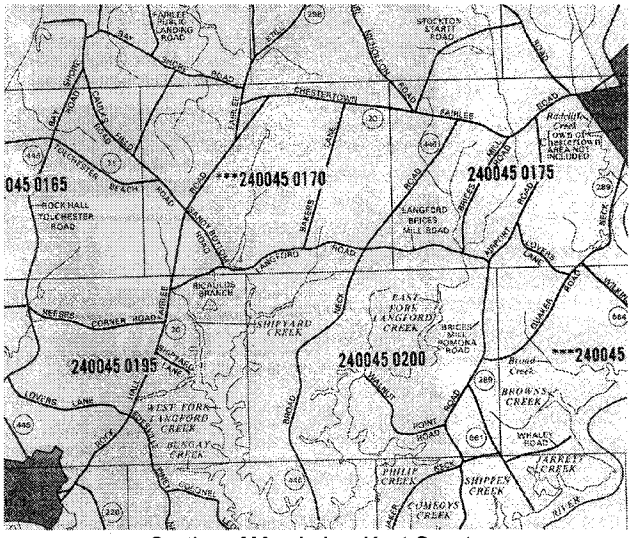


2. Approximate Study

Special flood hazard areas with little or no development potential were studied by less costly "approximate" methods. Usually, the original Flood Hazard Boundary Map delineations are transferred to a current FIRM for those areas not studied by detailed methods. Data used to delineate approximate boundaries of the 100-year floodplain may be from soils mapping, topographic maps, historic high-water profiles, aerial photographs of previous floods, or other appropriate sources. These are shown as "unnumbered A zones" on the FIRM and "approximate 100-year flood zones" on the FBFM. No 100-year flood elevations are determined for approximate floodplains.

Communities using these approximate maps must require that a 100- year flood elevation (base flood elevation (BFE)) be provided for individual permit applications. Data from sources other than the NFIP that provide a BFE for the site may be used. This may include State Highway Administration, Water Resources Administration, Army Corps of Engineers, Soil Conservation Service, and local government studies. FEMA Publication 265, "Managing Floodplain Development in Approximate Zone A Areas" outlines methods and includes a disk for determining water surface elevations in approximate A-zones.

The permit official is charged with using the best available information. If no information exists, and the proposed activity is less than 5 lots or 5 acres, the point-on-the-boundarymethod may be used. In this method, the ground elevation at the floodplain boundary nearest the site is assumed to be the 100-year flood elevation, and must be determined by a registered surveyor or engineer by scaling and surveying methods. If the proposed development is larger than this, detailed methods approved by FEMA must be employed.



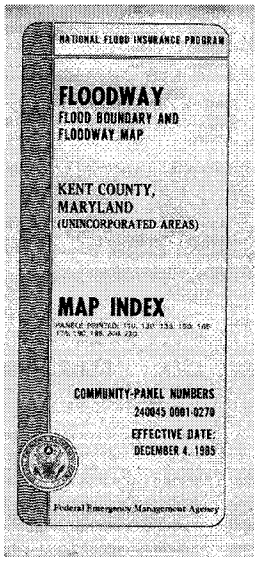
Section of Map Index, Kent County

C. Components of Flood Insurance Studies

1. Map Index

Many communities, including all Maryland counties, are geographically too large to fit on one map at an effective scale. These communities are therefore divided into two or more numbered "panels". Whenever a community requires more than one panel, a "Map Index" for both the FIRM and FBFM is prepared (see Figure 3-1).

The Map Index shows the entire community, with some prominent features, including major highways, railroads, and streams. It shows how the community was divided into the various panels.


NATIONAL FLOOD INSURANCE PROGRAM

FLOODWAY
FLOOD BOUNDARY AND FLOODWAY MAP

KENT COUNTY, MARYLAND
(UNINCORPORATED AREAS)

MAP INDEX

COMMUNITY-PANEL NUMBERS
240045 0061 0270

EFFECTIVE DATE:
DECEMBER 4, 1985

Federal Emergency Management Agency

PANELS PRINTED: FEMA prints only those panels having flood hazard areas. Printed panel numbers are indicated on the title block.

PANELS NOT PRINTED: Panels having no flood hazard areas are indicated by an asterisk (*) and are not printed.

MAP INDEX DATA: The date shown on the title block reflects the most recent revision. As changes occur within a community which result in a change in flood elevations or floodplain delineations, FEMA republishes only those map panels affected. The revised panel(s) is given a new map effective date indicating when it was officially revised and a letter suffix after "Community Number". The suffix always starts with the letter A and goes through the alphabet as subsequent revisions are made to the panel. A community may have different panels with different effective dates. The map index shows the most recent map panel effective date.

MAP PANEL NUMBER Each panel is given a unique number consisting of three parts:

Example: 240000 0001 B
(a) (b) (c)

(a) community number;
(b) panel number; and,
(c) panel suffix (if revised).

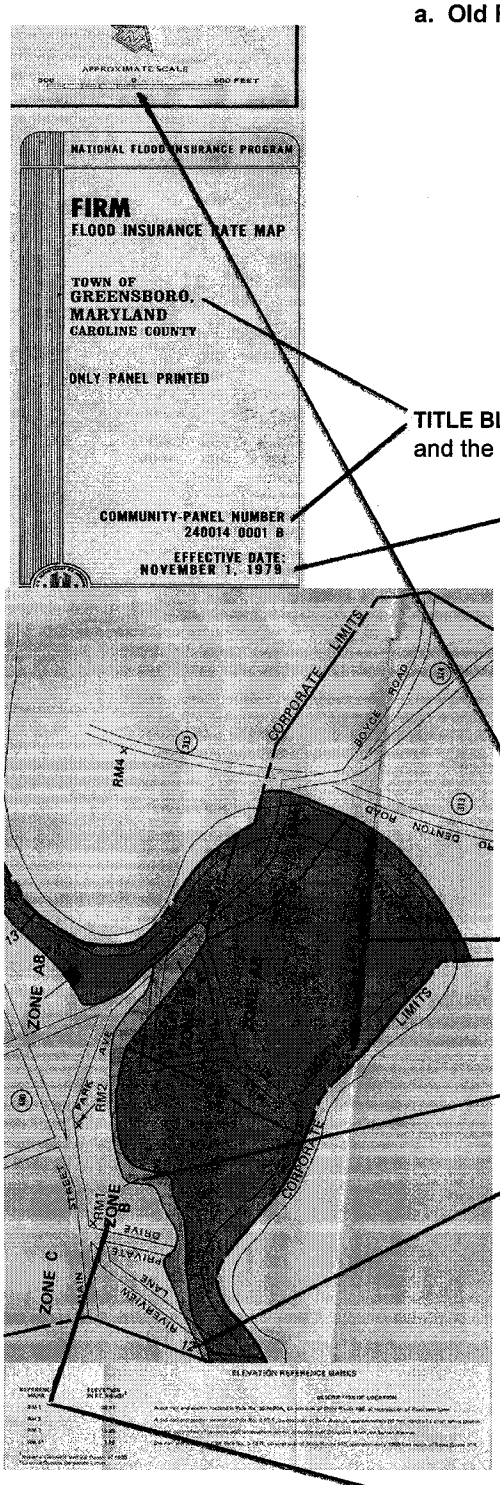
2. Detailed Study Areas

a. Old Format Maps

(1.) Flood Insurance Rate Map (FIRM)

The FIRM (Figure 3-2) is used mainly by lenders, insurance agents, and private citizens to determine:

- Whether a specific property is within the floodplain;
- The flood insurance zone that applies to the property; and,
- The whole number Base Flood Elevation (BFE) at the site for flood insurance rating purposes.



TITLE BLOCK: Includes the community name, community identification number, and the panel number.

MAP DATES: Several dates may be listed, including:

Initial Identification - date of first Flood Hazard Boundary Map;

Flood Insurance Rate Map Effective - date the community was converted to the Regular Program of the NFIP, which normally corresponds to the date of the initial FIS and FIRM if no revisions have been made; or,

Flood Insurance Rate Map Revision - date of subsequent revisions to the FIRM.

MAP SCALE: Different scales may appear on different panels for a community with more than one map panel.

100-YEAR FLOODPLAIN: Designated by the dark gray shaded areas (zones A, A1-A30, AO, AH, V, V1-V30). Areas of 100-year tidal flooding have the flood elevation noted in parentheses () beneath the zone designations.

500-YEAR FLOODPLAIN: Designated by the lighter gray shaded areas (Zone B).

BASE FLOOD ELEVATION (BFE): The water surface elevation of the base flood (100-year flood) at a point along the stream (wavy line) or in parenthesis for tidal BFEs.

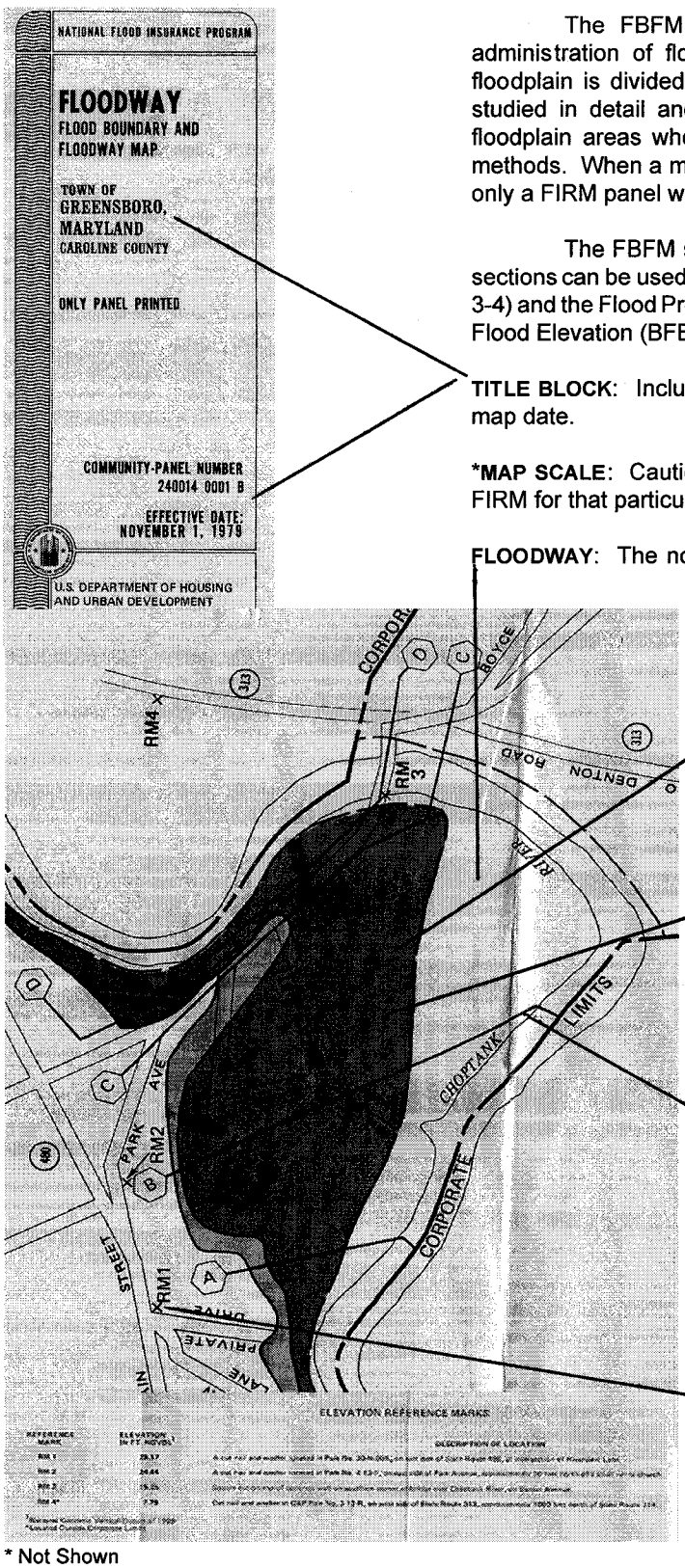
***ZONE CHANGE LINE**: The thin white line separates different flood zones within the 100-year floodplain. Some are particularly important, since they mark the tidal-nontidal boundary, or V-zone - A-zone boundary.

***APPROXIMATE FLOODPLAIN AREAS**: 100-year floodplain areas determined using approximate methods, known as unnumbered A-zones. No base flood elevations will be shown.

ELEVATION REFERENCE MARKS: Benchmarks with known, recorded elevations used by surveyors to determine unknown elevations specific nearby site.

*** Not Shown**

(2.) Flood Boundary and Floodway Map (FBFM)



The FBFM (Figure 3-3) is used by community officials for administration of floodplain ordinances. The FBFM shows how the floodplain is divided into floodway and flood fringe where streams are studied in detail and floodways calculated. They also show general floodplain areas where floodplains have been studied by approximate methods. When a map panel does not include any detailed study areas, only a FIRM panel will be printed.

The FBFM shows the location of stream cross sections. Cross sections can be used in conjunction with the Floodway Data Table (Figure 3-4) and the Flood Profiles to make a more exact determination of the Base Flood Elevation (BFE) for a site.

TITLE BLOCK: Includes the community name, community number, and map date.

***MAP SCALE**: Caution! The FBFM may have a different scale than the FIRM for that particular community.

FLOODWAY: The non-shaded areas adjacent to a stream between the heavy dashed lines. Development in the floodway should be prohibited to allow for the unobstructed passage of the 100-year flood.

FLOOD FRINGE: Shaded areas outside the floodway, but still within the 100-year floodplain. The flood fringe may be developed in the future, provided all new development complies with provisions in the Ordinance.

500-YEAR FLOODPLAIN: Lighter shaded areas adjacent to, but outside of the 100-year floodplain.

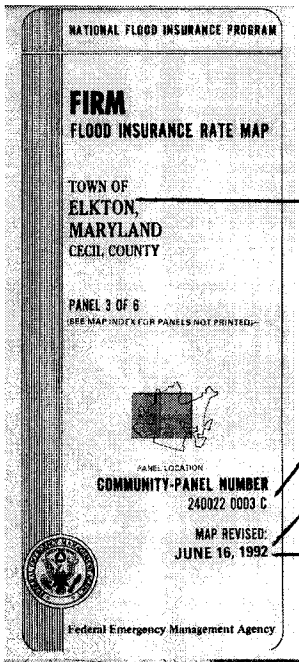
***APPROXIMATE FLOODPLAIN AREAS**: 100-year floodplain areas determined using approximate methods. The limits of the approximate floodplain on the FBFM are shown as dashed lines.

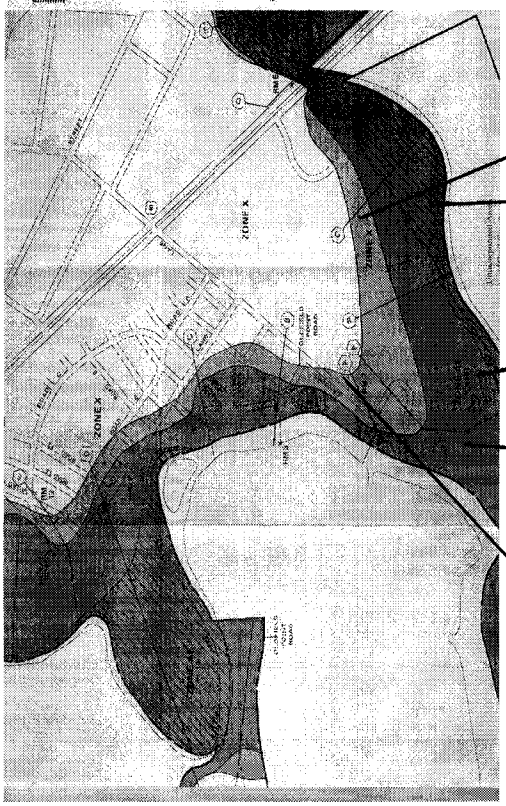
CROSS SECTION LINE: These lines represent the surveyed cross sections used in the computer model of the stream to calculate 100-year flood elevations. These cross sections can be used to relate a specific point on the FBFM to the Flood Profile and Floodway Data Table.

ELEVATION REFERENCE MARKS: Benchmarks with known, recorded elevations which are used by surveyors to determine unknown ground or lowest floor elevations at nearby locations.

* Not Shown

b. New Format Maps





* Not Shown

The new FIRMs (Figure 3-5) contain combined data from the former FBFMs and FIRMs. Therefore, they are used by both community officials for floodplain regulatory administration, and lenders and insurance agents to determine the need for flood insurance and to rate policy applications.

TITLE BLOCK: Includes the community name, community identification number, and panel number.

MAP DATES: Several dates may be listed, including:

Initial Identification - date of first Flood Hazard Boundary Map;

Flood Insurance Rate Map Effective Date - date the community was converted to the regular program of the NFIP which normally corresponds to the date of initial FIRM if no revisions have been made; or,

Flood Insurance Rate Map Revision - date of subsequent revisions to the FIRM.

***MAP SCALE**: Indicates the scale to which the map is drawn.

100-YEAR FLOODPLAIN: Designated by the dark gray shaded areas (Zones A, AE, A99, AO, AH, V, VE, and V99).

FLOODWAY: The cross-hatched areas adjacent to a stream. The floodway should remain in open space uses to allow for the unobstructed passage of the 100-year flood.

BASE FLOOD ELEVATION: The water surface elevation of the base flood (100-year flood) at that point of the stream (wavy line) or in parentheses for tidal BFEs.

ZONE CHANGE LINE: The thin white lines separate different flood zones within the 100-year floodplain. Of particular importance are those that separate nontidal from tidal zones and A-zones from V-zones.

***APPROXIMATE FLOODPLAIN AREAS**: 100-year floodplain areas determined using approximate methods, known as unnumbered A-zones. No base flood elevations are shown.

ELEVATION REFERENCE MARKS: Benchmarks with known, recorded elevations used by surveyors to determine unknown elevations at nearby locations.

CROSS SECTION LINE: The surveyed cross sections used in the computer model of the stream for calculating 100-year flood elevations. These cross sections can be used to relate a specific point on the FIRM to the Flood Profile or Floodway Data Table.

500-YEAR FLOODPLAIN: Light gray shaded area designated as Zone X on the new FIRMs.

C. Flood Insurance Study (FIS)

(1.) Floodway Data Table

The Floodway Data Table (Figure 2.1) in the FIS is prepared for studied stream reaches with a designated floodway. This table includes the computed 100-year flood elevation at each cross section which is used to determine the proper elevation for structures within the 100-year floodway fringe. The Floodway Data Table also provides the width of the floodway which can be useful for determining floodway boundaries. In addition, it provides a mean velocity for flood flows useful for flood-proofing designs.

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION		
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY (FEET NGVD)	WITH FLOODWAY	INCREASE
Little Elk Creek								
A	1,200[1]	1,480[3]	9,148	1.3	11.9	5.6[5]	6.6	1.0
B	2,090[1]	930[3]	1,719	7.0	11.9	6.8[5]	7.6	0.8
C	2,630[1]	770[3]	5,094	2.4	11.9	7.7[5]	8.2	0.5
D	5,380[1]	1,470[4]	8,933	1.4	11.9	8.6[5]	9.2	0.6
E	6,840[1]	1,800[4]	11,942	1.0	11.9	8.9[5]	9.6	0.7
F	7,520[1]	1,580[4]	8,413	1.5	11.9	9.0[5]	9.7	0.7
G	8,680[1]	170[4]	1,362	9.0	11.9	11.3[5]	12.2	0.9
H	9,230[1]	190[4]	1,747	7.0	13.7	13.7	14.4	0.7
I	10,640[1]	150[4]	1,329	9.2	16.0	16.0	16.4	0.4
J	11,960[1]	520[4]	1,905	6.4	19.8	19.8	20.3	0.5
K	12,890[1]	630[4]	4,258	2.9	21.8	21.8	22.2	0.4

Figure: 2.1

COMMUNITY AND STREAM IDENTIFIER: Found at bottom of table. Identifies the community and specific watercourse presented in table.

FLOODING SOURCE: Each line (row) represents data for a particular cross section. Each cross section in this table is also shown on the Flood Boundary and Floodway Map and the Flood Profile. Stream distance is the horizontal scale on the Flood Profile, usually in feet above the mouth or confluence of the watercourse.

FLOODWAY: These three columns provide specific data on the designated floodway.

WIDTH: Total width of the floodway, which can also be scaled from the FBFM or new format FIRM.

AREA: Cross-sectional area of the floodway.

VELOCITY: The average water velocity throughout the entire cross section which is usually lower than the flow velocity within the center of the channel.

BASE FLOOD WATER SURFACE ELEVATION: Tabulation of the actual computed 100-year flood elevation at each cross section.

REGULATORY: The water surface elevation which must be used for regulatory purposes. Usually it is the same as **Without Floodway**, unless backwater effects from another body of water takes precedence.

WITHOUT FLOODWAY: These elevations correspond to the 100-year flood levels shown on the flood profiles and the FIRM.

WITH FLOODWAY: These elevations represent the 100-year flood elevations assuming the entire flood fringe is filled (i.e., developed) to the 100-year flood level.

INCREASE: This last column represents the rise in the 100-year flood elevation or stage increase resulting from the floodway designation. This value is needed to determine the proper building elevation within the 100-year floodplainat this cross section.

(2.) Flood Profiles

The Flood Profile (Figure2.2), found at the back of the flood insurance study text for all detailed study stream reaches, is a graphical representation of flood depths along the stream reach. This profile can be thought of as a horizontal view of a section of the stream taken along the middle of the channel. The flood profile can be used to determine the Base Flood Elevation of a site. This is particularly useful for determining BFEs between cross sections.

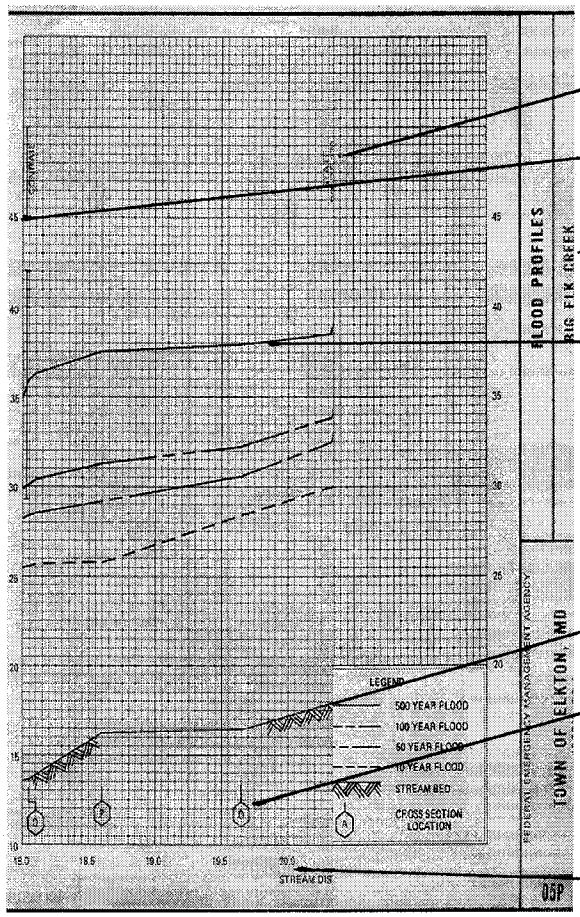


Figure 2.2

IDENTIFIABLE LANDMARKS: Any significant landmarks to assist in locating position along profile.

VERTICAL SCALE: Elevation in feet above mean sea level (MSL).

COMMUNITY IDENTIFIER AND STREAM IDENTIFIER: At side of graph. Identifies community and watercourse under consideration.

FLOOD PROFILE: Lines above the thalwag representing the flood elevation for specific flood frequencies (i.e., 10-year, 50-year, 100-year, and 500-year) at that particular point along the stream.

STREAM BED: The lowest surveyed point (thalwag) in the stream channel.

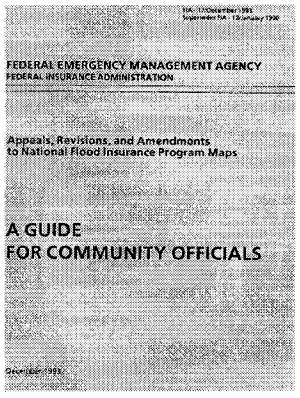
CROSS SECTION: Location of surveyed cross sections used in the hydraulic analysis. The actual 100-year flood elevation at each cross section is also shown in the Floodway Data Table. Each cross section on the profile is also shown on the FBFM.

HORIZONTAL SCALE: Distance along the center of the channel from reference point.

II. Amending or Revising the Maps or Study

A. Introduction

There may be situations where the floodplain boundary does not appear reasonable. FEMA recognizes that the mapping procedures are not sensitive enough to detect high spots in the floodplain or the scale large enough not to include some adjacent higher areas in the floodplain delineation. In addition, conditions change with time and subsequent development, which warrant changes to the maps. New studies are undertaken from time to time which need to be included on the maps. For these reasons, FEMA has developed a process to handle these situations. Publication FIA-12/December 1993, "Appeals, Revisions, and Amendments to National Flood Insurance Program Maps - A Guide for Community Officials" was printed to explain the process and should be part of every local floodplain manager's floodplain information file. The following information is abstracted from that publication.



Citizens and local governments play an important role in keeping the NFIP maps technically sound and up to date as conditions change in their communities. The flood risk information presented on the NFIP maps and in the FIS report forms the technical basis for floodplain management. In making revisions and amendments, FEMA must adhere to the same engineering standards applied in the preparation of original NFIP maps and reports, unless improved standards are approved. When adequate supporting data are submitted, FEMA will review the proposed changes to determine if they are scientifically and technically correct, and, if warranted, will approve the changes.

On October 1, 1992, FEMA developed new application forms and initiated a processing fee schedule for review of Map Revisions and Conditional Letters. A new simplified form for single residential lot or structure LOMAs and LOMRs was released in December of 1994. The new forms provide enough detail for review without the need to request additional information. Individual lot or structure Letters of Map Amendment are still reviewed at no charge to the applicant, since it corrects a map error.

Because the National Geodetic Survey has determined that the national vertical control network needs to be readjusted, FEMA will be converting maps gradually from the old national datum, National Geodetic Vertical Datum of 1929 (NGVD), to a new national datum, North American Vertical Datum of 1988, with 1991 revision (NAVD 88,91). FEMA is attempting to digitize the map data to make subsequent changes easier.

B. Changes Due to Errors of Mapping - Letters of Map Amendment (LOMA)

Any owner or lessee of property may request a determination be made that a particular structure or parcel of land is not in the 100-year floodplain. If the property is clearly delineated in the floodplain, but the natural land is above the 100-year flood elevation, a certified survey of the lowest adjacent grade immediately adjacent to the structure or the lowest point on the parcel (if the entire parcel is above the flood elevation) will be necessary. An Elevation Certificate certified by a registered surveyor or engineer should be submitted with the required application package to FEMA Region III.

Because the requirement for purchase of flood insurance and the federal and local regulations to build in the floodplain are both tied to this determination, it is advisable to complete the LOMA process prior to undertaking any construction. Even with a LOMA, construction of a basement is not advisable unless its floor will be above the 100-year flood elevation.

Upon review and agreement, FEMA will issue a LOMA to the applicant, with a copy to the community, that officially removes the structure or parcel from the floodplain. LOMAs are generally issued within 4 weeks for individual lots or structures. The basis for doing this is to correct a map error, so there is no cost to the applicant, except for the survey. The community is not involved in the process.

It is important to note that, should FEMA reissue the affected map panel, the LOMA will no longer be valid. If the amendment is not of sufficient size to appear on the new panel, the requester must request that FEMA reissue the LOMA.

C. Changes Due to Revisions to Floodplain Conditions

1. Conditional Letter of Map Revision (CLOMR)

Local ordinances require that those proposing to undertake significant floodplain modifications submit the proposed changes to FEMA through the community to assure that, if they are carried out as proposed, they are approvable by FEMA and will not aggravate existing flooding conditions. Those who construct buildings in or near floodplains must prove to lending institutions and local officials that the modifications will ensure that, after completion, the buildings will be out of the floodplain. Design plans and engineering data are submitted to FEMA for review and comments. FEMA issues a CLOMR concerning changes that would be approved to the NFIP map, based on the data submitted on the proposed development. If the project is carried out as submitted, the CLOMR certifies that the map changes will be approved, so any modifications after issuance of the CLOMR must be approved by FEMA. The CLOMR must be received prior to local approval of the development.

Fees are charged for conditional letters unless the proposed project undertaken by federal, State, or local government is certified as intended to reduce flood losses to existing development in identified flood hazard areas. The appropriate forms must be submitted to the FEMA regional office, including the Community Acknowledgement Form. Data submitted in support of the application that does not reflect actual conditions cannot be certified "as-built", but must reflect final design conditions and be signed and sealed by a registered professional engineer or surveyor.

FEMA will issue either a CLOMR, which describes the changes that could be made to the NFIP maps after the modifications are complete, or a letter that explains why FEMA could not recognize the effects if the proposed modifications were completed as planned.

2. Letter of Map Revision

Conditional letters do not actually revise an effective NFIP map. Once a project is completed, "as-built" information must be submitted to FEMA through the community to revise the map. FEMA will then issue the LOMR, based on the "as-built" submittal.

To request a LOMR, the appropriate application forms must be filled out, including the "Community Acknowledgement Form" signed by the CEO or designated community official. The forms should be submitted either to the Regional or National office Of FEMA, depending on the scope of the project. Requests take approximately eight weeks to process, depending on the complexity.

A community must request a Floodway Revision as part of the CLOMR and LOMR process before permitting any encroachment into a regulatory floodway that may cause any increase in flood levels. In extraordinary circumstances, the community may wish to shift the floodway or change its configuration. Since any study for revision (LOMR) which alters BFEs would require revised hydraulic analyses, the new modeling would revise the floodway boundaries using the altered BFEs..

Communities may request that NFIP maps be revised to incorporate new or corrected flood information. In fact, Section 65.3 of the NFIP regulations requires that participating communities inform FEMA of any physical changes that affect BFEs in the community and submit data that show the effects of those changes within 6 months of the date that the data become available. When a LOMR is issued, the changes made to the map are described in a letter, but the revised map panels are not published. If the changes involve increased flood risks, however, a physical map revision is made and a new panel issued. If the revision involves changes which reduce flooding to existing properties from projects undertaken by federal, State or local governments, the review fees may be waived upon request by the community and certification that the proposed changes will reduce flood losses to existing development.